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133 ley floors. Eolian hills are common in this southern region as well, since the fine dry soil is easily carried by the strong constantly blowing winds. Also, the topography of the whole Columbia Basin has been modified further by minor uplifts since the lava was laid down.

The Okanogan Highlands in the northwestern portion of the area and the Selkirk range in the northeast are spurs of the Rocky mountains consisting largely of granitic and metamorphic formations. The mountains of the Highlands, 5000 and 6000 feet in elevation, have been gently rounded by glacial action and subsequent erosion. The Selkirks, which reach somewhat greater heights, are considerably more rugged and the valleys are narrower.

The Blue mountains in northeastern Oregon are composed chiefly of basalt with islands of older granite projecting. These granitic islands or steptoes are also found in southeastern Washington. The maximum elevation in the Blue mountains is about 6,000 feet.[8]

132 Meteorological data pertaining to the Basin is given in accompanying table (tab. 1).[9] It will be seen that great yearly temperature ranges together with low precipitation characterize the central or relatively low lying portion of the area, whereas the peripheral regions of greater altitude show a somewhat smaller temperature range and markedly greater precipitation. The geographical center of the area is hardly two hundred and fifty miles from the Pacific Ocean with its temperate moisture-laden winds but the Cascade mountains prove so effectual a barrier that the interior is little influenced. What little moisture is carried east of the Cascade divide is precipitated mostly on the eastern slope of the mountains. Thus the Kittitas villages on the upper Yakima river were subject to a yearly precipitation of about twenty-five inches whereas Wanapam villages near the mouth of the same river enjoyed but

133 [8]Edwin J. Saunders, "The Physical Geography of Washington," in *Journal of Geography*, XIV, 309-22; Nevin M. Fenneman, *Physiography of Western United States* (New York, 1931), 210-70.

132 [9]Information furnished by courtesy of Dr. Albert L. Seeman, Department of Geography, University of Washington.

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TABLE 1.

METEOROLOGICAL DATA FOR TYPICAL STATIONS OF THE COLUMBIA BASIN

Territory	Station	Mean Monthly Temperature		Precipitation		
				Normal Monthly		Normal Annual
		July	Jan.	Nov.	Aug.	
Lakes	Revelstoke, B.C.	64	21	4.8	.6	40
Lakes	Northport, Wash.	68	23	2.3	.9	18
Lakes&Colville	Colville, Wash.	67	23	2.3	.7	16.5
Kalispel	Sandpoint, Id.	65	26	4.3	1.2	27.5
Coeur d'Alene	Coeur d'Alene, Id.	68	28	3.4	.6	25
Spokane	Spokane, Wash.	69	28	2.1	.6	16.5
Colville, Sanpoil, Lakes	Republic, Wash.	65	21	1.6	.9	15
Nespelem	Nespelem, Wash.	68	21	1.6	.5	15.5
Sanpoil	Wilbur, Wash.	66	22	1.8	.6	12.5
So. Okanogan	Omak, Wash.	74	22	1.4	.5	10.5
Chelan	Lakeside, Wash.	74	24	1.7	.3	12.5
Wenatchi	Wenatchee, Wash.	71	25	1.2	.3	9
Wenatchi	Leavenworth, Wn.	69	23	2.9	.4	20
Kittitas	Cle Elum, Wash.	65	26	4.7	.4	25.5
Kittitas	Ellensburg, Wash.	68	25	1.5	.2	9
Yakima	Rimrock, Wash.	64	26	4.2	.4	24.5
Yakima	Yakima, Wash.	71	27	.9	.2	8
Wanapam	Wahluke, Wash.	77	29	1	.3	6.5
Columbia	Ephrata, Wash.	77	25	1	.4	7.5
Palus	Hatton, Wash.	73	27	1.3	.4	9
Cayuse	Walla Walla, Wn.	74	33	2	.5	17
Umatilla	Umatilla, Ore.	75	33	1.2	.3	7.5

one-fourth that amount. Indeed within the confines of the Kittitas alone, at Ellensburg, twenty miles down-river from Cle Elum, the precipitation has dropped to less than ten inches. In Lakes territory extremes of forty inches at Revelstoke, B. C. (village no. 24) and sixteen and one-half inches at Colville, Washington (near villages nos. 1-4, 43) are found. In contrast to these variations is the relatively uniform annual precipitation of twenty-four to twenty-eight inches throughout most of the territory of the Coeur d'Alene and the Kalispel. A few Coeur d'Alene villages near Spokane received but fifteen inches. More striking is the meager six to fourteen inches noted throughout most of the territory of the Spokane, Sanpoil, Nespelem, Southern Okanogan, Chelan, Columbia, Wanapam, Walula, Palus, Umatilla and Cayuse. A considerable amount of this precipitation falls in the form of snow which usually remains on the ground throughout the winter. Precipitation of

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132 ten inches or less may be classed as definitely arid, making for desert conditions.

Temperatures throughout the Columbia Basin are much more uniform, month for month, than precipitation. Characterizing the whole area, however, are extreme ranges from summer maximums to winter minimums. "The average annual range is between 40 and 50 degrees F. with winter temperatures about 20 to 30 degrees F. and summer temperatures from 65 to 80 degrees F. The extreme range for any one station is 140 degrees F. but temperatures as low as -36 degrees F. and as high as 115 degrees F. have been recorded at different stations. Temperatures as low as -20 degrees F. and as high as 100 degrees F. are common, but the cold and warm spells are of short duration and are not felt as much as the figures might indicate on account of the low humidity of the air."[10]

137 Four plant life zones, the Upper Sonoran, the Arid Transition, the Canadian and the Hudsonian, are represented in this area. Of these the first two are by far the most extensive and nearly all native villages were located in these zones. Hunting and gathering territories, however, extended into the Canadian and Hudsonian especially in peripheral regions. The Upper Sonoran is typical of the Columbia plains or lava plateau, while the Arid Transition characterizes the lower reaches of the surrounding mountains. Higher in the mountains is found the Canadian zone and more rarely the Hudsonian. The most conspicuous plant of the Upper Sonoran in this region is the sagebrush *(Artemisia tridentata)*. Other prominent plants include rabbit brush *(Chrysothamnus nauseosus)*, antelope brush *(Purshia tridentata)* and dragon sagewort *(Artemisia dracunculus)*. The Arid Transition zone is divided into two subareas. The lower is characterized by bunchgrass *(Agropyron spicatum)* and often called the bunchgrass prairies. The upper division is typified by the presence of yellow pine *(Pinus ponderosa)* forests. The bunchgrass prairies occupy narrow marginal strips near the mountains and shade into the pine forests as soon as the elevation becomes noticeable. The Cana-

[10]Saunders, 321.